Zeta Plus™ MHT Series filters are a family of advanced, dual-zone depth filters designed to provide optimal clarification and prefiltration in food and beverage applications. The Zeta Plus filter design consists of two distinct layers or “zones” of filter media with the upstream zone more open than the downstream zone. This structure enhances the contaminant holding capacity of the filter media, since larger particles are trapped in the upper zone of the filter media and smaller particles are trapped in the lower zone, reducing premature plugging and extending service life. The two filter zones can be independently selected and combined to optimise performance.

**Superior particle removal**
The Zeta Plus MHT filter medium offers advantages in contaminant removal by combining mechanical entrapment with electro-kinetic adsorption. Larger particulate and hazes are mechanically entrapped in the depth of the media, while negatively-charged particles, such as bacteria, yeast and submicronic hazes are adsorbed to the positively-charged Zeta Plus filter media.

**Applications**
The Zeta Plus MHT Series is ideally suited for clarification and prefiltration in food and beverage, cosmetic and general applications where the exceptional high wet-tensile strength media, combined with the dual-zone design, provides extended service life. These include aqueous, alcoholic, proteinaceous and acidic solutions.

**Features and benefits**

- **2 grades of filtration combined in one cartridge**
  - Reduction of capital investment
  - Reduction of direct and indirect costs (reduced product loss, reduction in amount of water needed for regeneration, sanitation, rinsing, etc…)

- **“A la carte” media**
  - Customised filter to match your product needs
  - Flexibility of use
  - Maximised final membrane protection

- **Thermal and chemical stability**
  - Extended life
  - Reduced filtration costs due to stability with chemical and thermal sanitation/regeneration

- **Qualification testing**
  - System installation integrity testable

- **High tensile strength media (HT)**
  - Robust and easy-to-handle cartridge design

- **Range of standard cartridges availability (8, 12 and 16”)**
  - Cost-effective sizing

- **Totally enclosed system**
  - Secure and hygienic with low product loss

- **Approved for food contact use**
  - Complies with European and US regulations

**Applications**

**Food and beverages**
- Alcoholic beverages
- Dairy products
- Juices
- High fructose corn syrup
- Edible oils

**Nutraceuticals**
Chemical compatibility

The compatibility with various commonly used chemicals is indicated in table 1. It is recommended that you test the product under standard conditions of use. All tests have been carried at ambient temperature (20 °C) unless otherwise indicated.

Cartridge construction

Zeta Plus™ MHT Series filter cartridges are designed for use with 3M Purification Zeta Plus sanitary style stainless steel filter housings. The cartridges are constructed from individual cells of Zeta Plus MHT filter medium assembled together with polypropylene separators under predetermined compression and unitised by three, 316 stainless steel bands. Each cell is constructed using polypropylene-moulded edge seals and separators for high performance. Various gasket materials are available depending upon the application. Filter cartridges are available in 8”, 12” and 16” diameters, with surface area ranging from 0.23 m² to 1.84 m² per cartridge.

Flow rates

Figure 1 gives the initial Delta P values for Zeta Plus MHT as a function of unit area (lpm/m²) with clean filtered water. When sizing, always use the Delta P of the qualifying grade.

Grade selection

Zeta Plus MHT filter media are available in nine standard grade combinations. Figure 2 is provided as a guide to correct grade selection based on nominal retention ratings and can be used in conjunction with the recommendations in table 2 to determine the appropriate filter grade for your application. Operating conditions and the fluid being filtered impact retention performance. Small-scale pilot runs with Zeta Plus BC capsule filters can be performed to confirm grade selection prior to scale-up. 3M Purification’s Scientific Applications Support Services (SASS) staff can assist in grade selection as well as assist with on-site evaluations. Filter system optimisation can also be conducted at 3M Purification’s laboratory facilities.

For scale-up evaluations, it is strongly recommended that customers contact 3M Purification Scientific Application Support Services (SASS) for assistance.

Regulatory compliance

Zeta Plus MHT Series filter cartridges comply with the requirements of Regulation (EC) 1935/2004 for their intended food contact applications. All materials of construction comply with the requirements of the Food and Drug Administration’s (FDA) Code of Federal Regulations (CFR), Title 21 parts 170-199 for contact with food. The filters meet the requirements of USP for the Biological Test for Plastics, Class VI. Contact 3M Purification for further information.
**Conditions of use**

Zeta Plus™ MHT filter cartridges are available in various combination of grades to ideally match your different filtration application needs. The performances of the various media ratings are indicated in the table below. The optimal media combination choice for your application may require determination by an on-site trial or performed in one of our laboratory by our Scientific Application Support Services (SASS) group.

**Quality control**

Zeta Plus MHT is manufactured using a quality assurance program certified under ISO. Every cartridge is identified with a unique lot number, which allows for total product and components traceability.

**Sanitary filter housings**

3M Purification provides a wide array of standard and custom-designed sanitary filter housings to accommodate Zeta Plus MHT filter cartridges. All housings are designed with the food and beverage industries in mind and feature 316L mirror-polished surfaces and easy-to-clean components, along with accessories such as CIP spray-balls and the Zeta Plus Lifting Device. Custom-designed skid systems incorporating Zeta Plus and membrane cartridge filter housings, together with process piping, flow control and complete validation documentation (IQ, OQ), are also available.

**Throughput comparison**

Figure 3 is a comparison of throughput volumes for a high particulate load wine (critical application) and low particulate load wine (non-critical). Results are compared to throughput values generated on standard Zeta Plus HT media and the competitor P equivalent on a low particulate load wine. The results show a gain of 25% life on a low particulate load wine and up to 42% on a high particulate load wine. In a recent study a customer realised a 31% cost saving during the regeneration and hot water sanitation steps of his process. 25% of his savings was from reduced water usage and 75% from reduced filter usage due to extended life and throughput offered by Zeta Plus MHT.
### 1. Cartridges

<table>
<thead>
<tr>
<th>Zeta Plus™</th>
<th>Diameter (inch)</th>
<th>Cartridge design</th>
<th>Gasket type</th>
<th>Filter layer grade</th>
<th>Formulation</th>
<th>Pre-filtration grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>08</td>
<td>P = Plug-in 7 cells (0.23 m²)</td>
<td>Standard</td>
<td>03 - 003HT</td>
<td>MH</td>
<td>01</td>
</tr>
<tr>
<td>Z</td>
<td>12</td>
<td>D = Standard 8 cells (0.26 m²)</td>
<td>A = Silicone (MVQ)*</td>
<td>10 - 015HT</td>
<td>02</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>12</td>
<td>C = 9 cells / small (0.85 m²)</td>
<td>D = Nitrile (NBR)*</td>
<td>03 - 050HT</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>16</td>
<td>B = Special precoat 12 cells (1.1 m²)</td>
<td>Options A = Silicone (MVQ)*</td>
<td>05 - 080HT</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>16</td>
<td>D = Standard 16 cells (1.5 m²)</td>
<td>B = Fluorocarbon (FPM)*</td>
<td>10 - 150HT</td>
<td>07</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>16</td>
<td>S = Special 7 cells (0.7 m²)</td>
<td>C = EPR (EPDM)*</td>
<td></td>
<td>08</td>
<td></td>
</tr>
</tbody>
</table>

#### Options
- A = Silicone (MVQ)*
- B = Fluorocarbon (FPM)*
- C = EPR (EPDM)*

### 2. Zeta Plus™ BC Capsules

<table>
<thead>
<tr>
<th>Catalogue number</th>
<th>Grade and formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 0025L (Luer)</td>
<td>10MH01 10MH02 10MH03</td>
</tr>
<tr>
<td>BC 0025S (Sanitary)</td>
<td>60MH05 70MH05 90MH05</td>
</tr>
<tr>
<td>BC 1000A (single pack)</td>
<td>10MH01 10MH02 30MH02 90MH05</td>
</tr>
<tr>
<td>BC 1000B (3 pack)</td>
<td>10MH03 90MH08 60MH03</td>
</tr>
<tr>
<td>BC 2000A (single pack)</td>
<td>10MH01 10MH02 30MH02</td>
</tr>
<tr>
<td>BC 2000B (3 pack)</td>
<td>10MH03 90MH08 60MH03</td>
</tr>
</tbody>
</table>

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